Appendix 1 Summary of reproductive studies in parrots (Family Psittacidae) within the Australian region.

Table A1. Reproductive success studies undertaken on wild populations of Psittacidae in Australia, New Zealand and New Caledonia. The table summarises conservation status and provides reference to reproductive success studies derived from Higgins (1999). The notation for reproductive studies are PK = poorly known, FWK = fairly well known and WK = well known. The species status is based on Higgins (1999) and International Union for the Conservation of Nature (2002) criteria. Ex = Extinct, En = Endangered, V = Vulnerable, R = Rare, S = Secure.

Species	Scientific Name	Status	Reproductive Studies	Country
Rainbow Lorikeet	*Trichoglossus haematodus*	S	PK	Aus
Scaly-breasted Lorikeet	*T. chlorolepidotus*	S	PK	Aus
Varied Lorikeet	*Psitteuteles versicolor*	S	PK	Aus
Musk Lorikeet	*Glossopsitta concinna*	S	PK	Aus
Little Lorikeet	*G. pusilla*	S	PK	Aus
Purple-crowned Lorikeet	*G. porphyrocephala*	S	PK	Aus
Diademed Lorikeet	*Charmosyna diadema*	Ex	No studies	NC
Eclectus Parrot	*Eclectus roratus*	R	PK	Aus
Red-cheeked Parrot	*Geoffroyus geoffroyi*	R	PK	Aus
Double-eyed Fig-Parrot	*Cyclopsitta diophthalma*	S	PK	Aus
Australian King-Parrot	*Alisterus scapularis*	S	PK	Aus
Red-winged Parrot	*Aprosmictus erythropterus*	S	PK	Aus
Superb Parrot	*Polytelis swainsonii*	V	FWK (Webster & Llewellyn 1991)	Aus
Regent Parrot	*P. anthopeplus*	V	FWK (Long 1989)	Aus
Princess Parrot	*P. alexandrae*	R	PK	Aus
Green Rosella	*Platycercus caledonicus*	S	PK	Aus
Crimson Rosella	*P. elegans*	S	WK (Krebs 1998)	Aus
Eastern Rosella	*P. eximius*	S	WK (Penck 1992)	Aus
Pale-headed Rosella	*P. adscitus*	S	PK	Aus
Northern Rosella	*P. venustus*	S	PK	Aus
Western Rosella	*P. icterotis*	S	PK	Aus
Eastern Ringneck	*Barnardius barnardi*	S	PK	Aus
Western Ringneck	*B. zonarius*	S	FWK (Long 1989)	Aus
Red-capped Parrot	*Purpureicephalus spurius*	S	FWK (Long 1989)	Aus
Blue Bonnet	*Northiella haematogaster*	S	PK	Aus
Swift Parrot	*Lathamus discolor*	En	PK	Aus
Red-rumped Parrot	*Psephotus haematonotus*	S	FWK (Bourke 1948)	Aus
Mulga Parrot	*P. varius*	S	PK	Aus
Golden-shouldered Parrot	*P. chrysopterygius*	En	WK (Garnett & Crowley 1998)	Aus

Table A1 continued. Reproductive success studies undertaken on wild populations of Psittacidae in Australia, New Zealand and New Caledonia. The table summarises conservation status and provides reference to reproductive success studies derived from Higgins (1999). The notation for reproductive studies are PK = poorly known, FWK = fairly well known and WK = well known. The species status is based on Higgins (1999) and International Union for the Conservation of Nature (2002) criteria. Ex = Extinct, En = Endangered, V = Vulnerable, R = Rare, S = Secure.

Species	Scientific Name	Status	Reproductive Studies	Country
Hooded Parrot	*P. dissimilis*	S	WK (Reed & Tidemann 1994)	Aus
Paradise Parrot	*P. pulcherrimus*	Ex	No studies	Aus
New Caledonian Horned Parakeet	*Eunymphicus cornutus*	V	PK	NC
Antipodes Island Parrot	*Cyanoramphus unicolor*	S	PK	NZ
Red-crowned Parakeet	*C. novaezelandiae*	S	WK (Greene 1991)	NZ
Norfolk Island Green Parrot	*C. cooki*	En	WK (Hicks & Greenwood 1989)	Aus
Orange-crowned Parakeet	*C. malherbi*	En	PK	NZ
Yellow-crowned Parakeet	*C. auriceps*	S	WK (Elliott *et al.* 1996)	NZ
Forbes' Parakeet	*C. forbesi*	En	PK	NZ
New Caledonian Red-crowned Parakeet	*C. saisetti*	V	No studies	NC
Budgerigar	*Melopsittacus undulatus*	S	WK (Wyndham 1981)	Aus
Burke's Parrot	*Neopsephotus bourkii*	S	PK	Aus
Blue-winged Parrot	*Neophema chrysostoma*	S	PK	Aus
Elegant Parrot	*N. elegans*	S	PK	Aus
Rock Parrot	*N. petrophila*	S	PK	Aus
Orange-bellied Parrot	*N. chrysogaster*	En	WK (this study)	Aus
Turquoise Parrot	*N. pulchella*	V	WK (Quin 1990)	Aus
Scarlet-chested Parrot	*N. splendida*	R	PK	Aus
Ground Parrot	*Pezoporus wallicus*	S	WK (McFarland 1991)	Aus
Night Parrot	*Pezoporus occidentalis*	Ex	No studies	Aus
Kea	*Nestor notabilis*	V	WK (Jackson 1963)	NZ
Kaka	*N. meridionalis*	V	WK (Moorhouse *et al.* 2002)	NZ
Norfolk Island Kaka	*N. productus*	Ex	No studies	Aus
Kakapo	*Strigops habroptilus*	En	WK (Elliott *et al.* 2006)	NZ

Appendix 2 Orange-bellied Parrot nest box design.

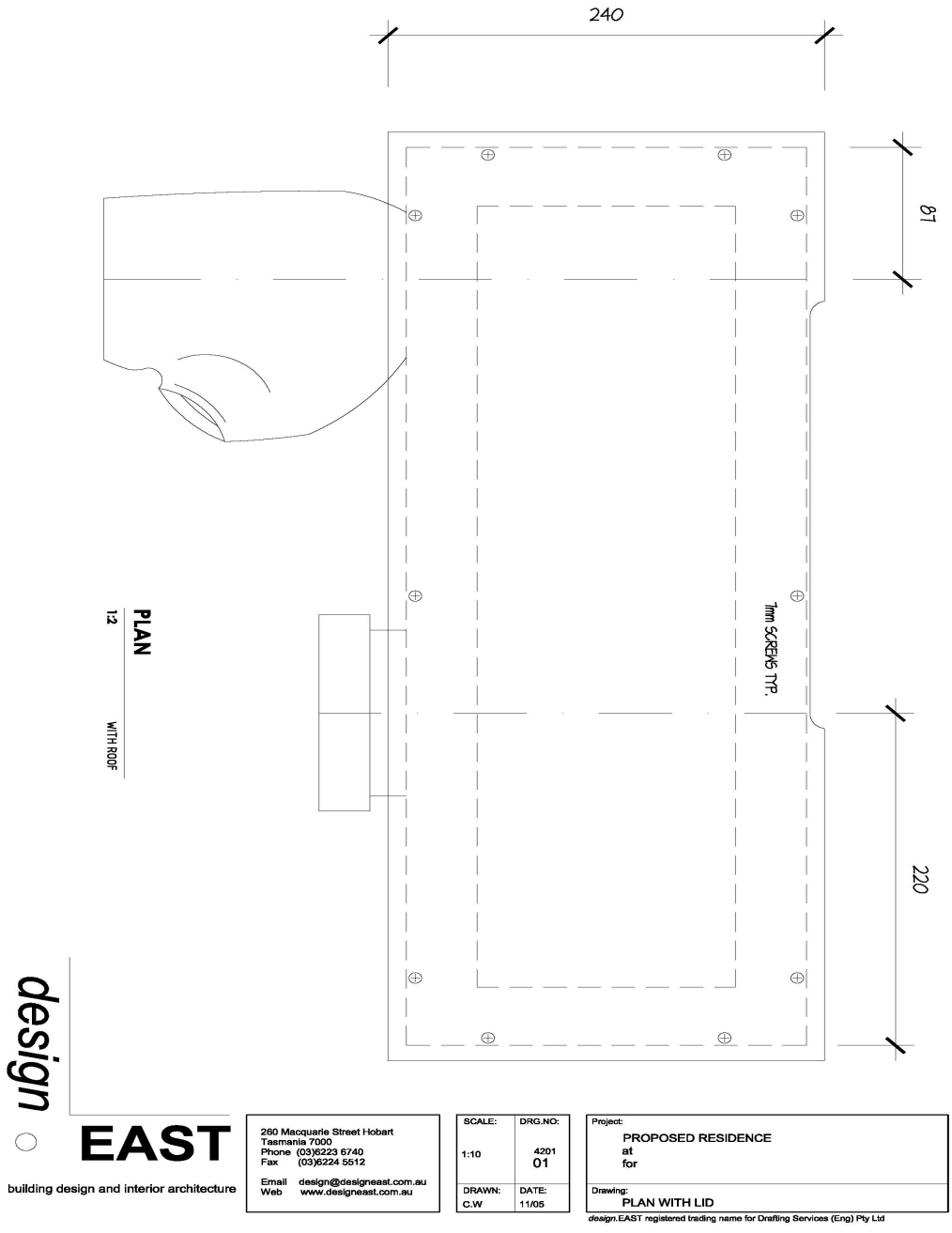

Figure A1. Plan of Orange-bellied Parrot nest box.

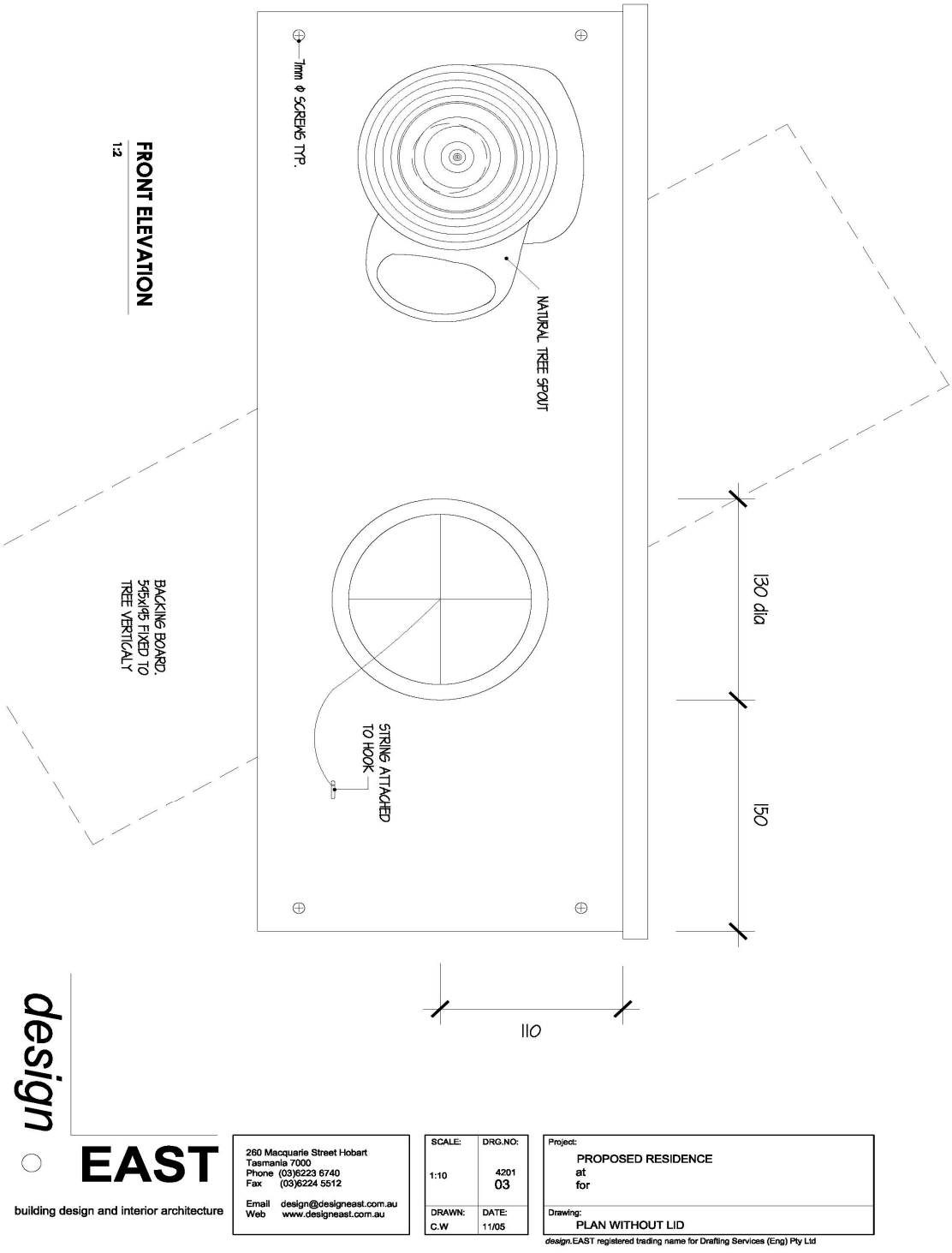

Figure A2. Front elevation of Orange-bellied Parrot nest box.

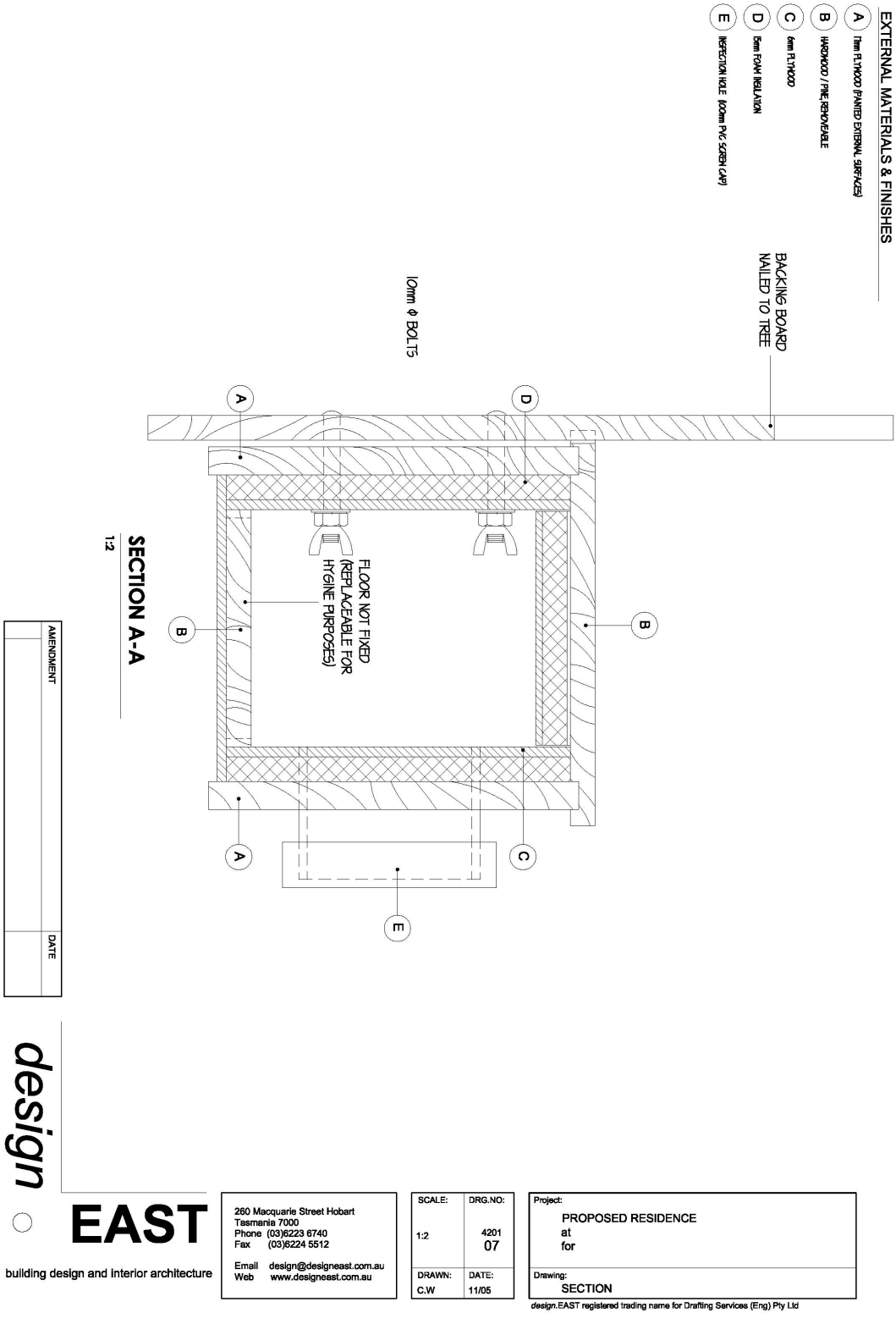

Figure A3. Section A-A of Orange-bellied Parrot nest box.

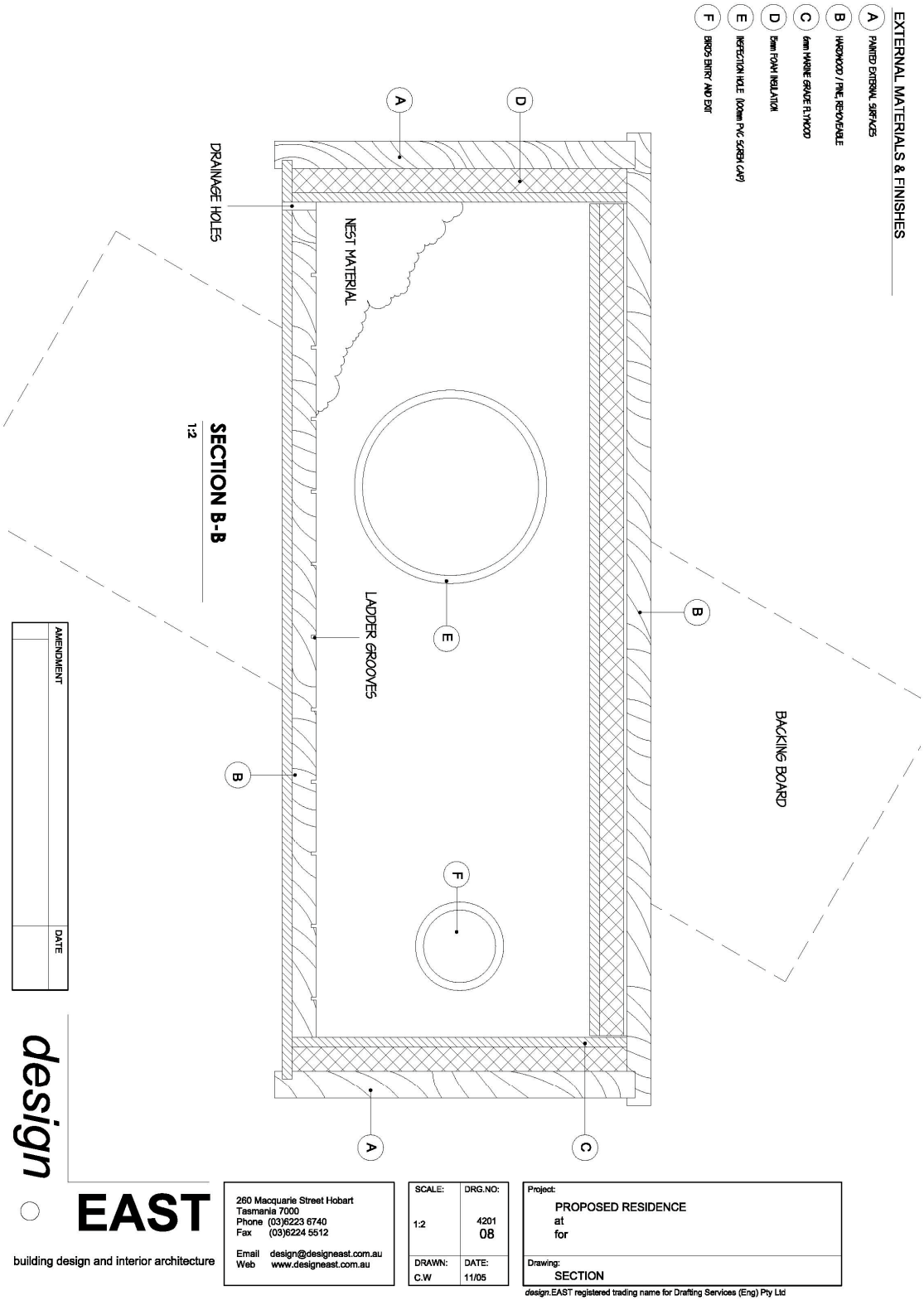

Figure A4. Section B-B of Orange-bellied Parrot nest box.

Appendix 3 Nest box occupancy.

Table A2. Occupancy of nest boxes at Melaleuca from 1992/93 – 2004/05 showing Tree Martin (TM), Orange-bellied Parrot (OBP), empty boxes (E), ant spp. (A), Common Starling (CS), Green Rosella (GR), Australian Owlet Nightjar (AON), Common Ring-tailed Possum (CRP), Honeybee (HB), Eastern Pygmy-possum (EPP) and Chocolate Wattled Bat (CWB).

Year	Total boxes	TM	OBP	E	A	CS	GR	AON	CRP	HB	EPP	CWB
1992/93	21	6	8	6	1	0	0	0	0	0	0	0
1993/94	23	6	13	2	2	0	0	0	0	0	0	0
1994/95	24	6	14	3	1	0	0	0	1	0	0	0
1995/96	42	12	14	8	7	1	0	0	0	0	0	0
1996/97	42	15	13	6	7	1	0	0	0	0	0	0
1997/98[1]	42	12	16	6	7	6	0	0	0	0	0	0
1998/99[2]	42	19	16	3	5	0	0	0	0	0	0	1
1999/00	44	20	17	2	4	1	0	0	0	0	0	0
2000/01	46	23	15	2	2	0	0	1	1	1	1	0
2001/02	47	25	16	1	2	0	1	1	0	1	0	0
2002/03[3]	49	29	15	0	3	4	1	1	0	0	0	0
2003/04	52	26	17	3	1	3	2	0	0	0	0	0
2004/05	48	25	18	4	1	0	0	0	0	0	0	0
Total	522	224	192	46	43	16	4	3	2	2	1	1

[1] Five boxes were occupied by CS in October. All but 1 CS removed prior to OBP breeding.[2] One OBP shared a nest box with TM and the bat was in another box with TM. [3] Three TM nested on top of abandoned Starling nests that were destroyed early in the season.

Table A3. Occupancy of nest boxes at Birchs Inlet from 1998/99 – 2004/05 showing Common Starling (CS), Orange-bellied Parrot (OBP), empty boxes (E), Tree Martin (TM), ant spp. (A), Honeybee (HB), Sugar Glider (SG) and Eastern Pygmy-possum (EPP).

Year	Total boxes	CS	OBP	E	TM	A	HB	SG	EPP
1998/99	11	9	0		0	2	0	0	0
1999/00	21	2	7	10	1	1	0	0	0
2000/01	31	6	9	8	4	1	1	1	1
2001/02	42	10	11	10	4	4	2	1	0
2002/03	50	9	9	9	9	6	4	4	0
2003/04	30	10	6	1	9	1	3	0	0
2004/05	39	12	6	6	2	5	5	3	0
Total	224	58	48	44	29	20	15	9	1

Appendix 4 Orange-bellied Parrot reproductive success tables.

Table A4. Orange-bellied Parrot clutches/active nest (natural and boxes) showing total number of eggs laid and mean clutch size for all nests with eggs for each breeding season from 1993/94 – 2004/05.

Year	Natural nests	Nest boxes	Total OBP nests	Nests with known contents	Nests with eggs	Clutch size per nest							Eggs laid	Mean clutch size
						0	1	2	3	4	5	6		
1993/94	0	13	13	12	11	1	0	1	0	5	5	0	47	4.3
1994/95	0	14	14	12	12	0	0	0	1	3	7	1	56	4.7
1995/96	1	14	15	14	13	1	0	1	0	6	5	1	57	4.4
1996/97	1	13	14	13	12	1	0	0	3	2	7	0	52	4.3
1997/98	2	16	18	18	18	0	0	1	2	2	9	4	85	4.7
1998/99	4	16	20	19	19	0	0	1	1	6	8	3	87	4.6
1999/00	4	17	21	15	15	0	0	0	0	4	9	2	73	4.9
2000/01	3	15	18	16	15	1	0	0	1	4	9	1	70	4.7
2001/02	1	16	17	17	17	0	0	0	1	1	13	2	84	4.9
2002/03	2	15	17	17	17	0	0	0	2	3	8	4	82	4.8
2003/04	1	17	18	18	17	1	0	0	0	1	10	6	90	5.3
2004/05	1	18	19	19	19	0	0	0	0	7	9	3	91	4.8
Total	20	184	204	190	185	5	0	4	11	44	99	27	874	4.7

Table A5. Orange-bellied Parrot egg fertility and hatching success for all nests at Melaleuca, 1993–2005.

Year	Nests with known contents	Nests with eggs	Eggs laid	Unhatched infertile eggs	Unhatched fertile eggs	Unhatched unknown egg fertility	Total unhatched	Egg fertility rate	Total hatched	Hatch success (fertile eggs)	Hatch success (all eggs)
1993/94	12	11	47	2	5	0	7	0.96	40	0.89	0.85
1994/95	12	12	56	4	3	1	8	0.91	48	0.94	0.86
1995/96	14	13	57	10	1	2	13	0.79	44	0.98	0.77
1996/97	13	12	52	2	1	0	3	0.96	49	0.98	0.94
1997/98	18	18	85	10	5	0	15	0.88	70	0.93	0.82
1998/99	19	19	87	13	10	3	26	0.82	61	0.86	0.70
1999/00	15	15	73	2	8	0	10	0.97	63	0.89	0.86
2000/01	16	15	70	26	0	1	27	0.61	43	1.00	0.61
2001/02	17	17	84	6	4	2	12	0.90	72	0.95	0.86
2002/03	17	17	82	12	1	5	18	0.79	64	0.98	0.78
2003/04	18	17	90	12	4	5	21	0.81	69	0.95	0.77
2004/05	19	19	91	8	6	5	19	0.86	72	0.92	0.79
Total/mean	190	185	874	107	48	24	179	0.85	695	0.94	0.80

Table A6. Orange-bellied Parrot nestling survival and success rate for all nests at Melaleuca, 1993–2005.

Year	Nests with eggs	Nests with nestlings	Total hatched	Hatchling deaths	Advanced age deaths	Total nestling mortality	Nestling mortality rate	Fledged	Output (fledglings/nest with eggs	Fledging success	Breeding success
1993/94	11	11	40	1	7	8	0.20	32	2.9	0.80	0.68
1994/95	12	12	48	6	5	11	0.23	37	3.1	0.77	0.66
1995/96	13	11	44	3	2	5	0.11	39	3.0	0.89	0.68
1996/97	12	12	49	2	10	12	0.24	37	3.1	0.76	0.71
1997/98	18	18	70	4	8	12	0.17	58	3.2	0.83	0.68
1998/99	19	17	61	2	0	2	0.03	59	3.1	0.97	0.68
1999/00	15	14	63	8	0	8	0.13	55	3.7	0.87	0.75
2000/01	15	12	43	0	1	1	0.02	42	2.8	0.98	0.60
2001/02	17	17	72	0	1	1	0.01	71	4.2	0.99	0.85
2002/03	17	15	64	3	5	8	0.13	56	3.3	0.88	0.68
2003/04	17	17	69	2	2	4	0.06	65	3.8	0.94	0.72
2004/05	19	17	72	9	8	17	0.24	55	2.9	0.76	0.60
Total/mean	185	173	695	40	49	89	0.13	606	3.3	0.87	0.69

Table A7. Productivity and distance to feed tables for individual nests at Melaleuca for the period 1992/93 – 2004/05. Nest locations are shown in Figures 2.2 and 2.3. Success is calculated by the percentage of fledglings from total eggs laid. The output of each nest is calculated by dividing the total number of fledglings by the number of nesting attempts. Nests marked (*) are natural nests.

Nest	Dist. to table (m)	Attempts	Eggs laid	Mean clutch size	Nestlings	Mean brood size	Fledglings	Mean output	Success
DK 1	10	5	24	4.8	23	4.6	23	4.6	0.96
DK 2	10	3	12	4	9	3.0	8	2.7	0.67
DK 2a	10	4	18	4.5	17	4.3	17	4.3	0.94
DK 3	10	1	3	3	3	3.0	3	3	1
DK 4	10	1	5	5	2	2.0	2	2	0.4
DK 5	60	4	21	5.3	19	4.8	9	2.3	0.43
DK 6	80	7	33	4.7	25	3.6	23	3.3	0.7
DK 7	80	3	10	3.3	10	3.3	10	3.3	1
DK 9	90	3	13	4.3	13	4.3	13	4.3	1
DWL	1500	1	4	4	3	3.0	3	3	0.75
Hut 1	250	1	5	5	5	5.0	0	0	0
Hut 2	250	4	19	4.8	18	4.5	11	2.8	0.58
Hut 2a	250	2	11	5.5	10	5.0	10	5	0.91
Hut 3	260	5	25	5	18	3.6	18	3.6	0.72
Hut 5	270	3	15	5	14	4.7	9	3	0.6
Hut 6	270	1	5	5	5	5.0	5	5	1
Lag 1	790	4	15	3.8	4	1.0	1	0.3	0.07
Lag 2	900	7	31	4.4	24	3.4	21	3	0.68
Lag 3	470	6	30	5	24	4.0	23	3.8	0.77
Lag 4	430	7	32	4.6	25	3.6	22	3.1	0.69
MC 1	600	2	10	5	9	4.5	5	2.5	0.5
MC 2	1110	1	6	6	5	5.0	5	5	0.83
MC 3	1080	1	6	6	4	4.0	4	4	0.67
MP 1	1860	2	10	5	6	3.0	6	3	0.6
MP 2	1860	1	5	5	5	5.0	5	5	1
MP 3	1830	1	4	4	4	4.0	3	3	0.75
MP 5	1620	1	5	5	4	4.0	4	4	0.8
MP 6	1620	2	8	4	5	2.5	4	2	0.5
MP 7	1690	3	16	5.3	15	5.0	11	3.7	0.69
MP 8	1690	1	4	4	2	2.0	1	1	0.25
MP 11	1730	3	13	4.3	11	3.7	10	3.3	0.77
NC 1	1000	4	23	5.8	19	4.8	17	4.3	0.74
NC 3	1200	1	5	5	5	5.0	4	4	0.8
NC 4	1200	3	13	4.3	4	1.3	4	1.3	0.31
NP 1	1990	7	38	5.4	33	4.7	31	4.4	0.82
NP 3	1860	6	29	4.8	17	2.8	17	2.8	0.59
NP 4	1800	4	18	4.5	18	4.5	15	3.8	0.83
NP 5	1740	1	5	5	4	4.0	4	4	0.8
NWCT*	5580	5	26	5.2	22	4.4	21	4.2	0.81
Obs	10	3	14	4.7	7	2.3	7	2.3	0.5
Ral 1	10	8	36	4.5	32	4.0	28	3.5	0.78

Table A7 continued. Productivity and distance to feed tables for individual nests at Melaleuca for the period 1992/93 – 2004/05. Nest locations are shown in Figures 2.2 and 2.3. Success is calculated by the percentage of fledglings from total eggs laid. The output of each nest is calculated by dividing the total number of fledglings by the number of nesting attempts. Nests marked (*) are natural nests.

Nest	Dist. to table (m)	Attempts	Eggs laid	Mean clutch size	Nestlings	Mean brood size	Fledglings	Mean output	Success
Ral 2	10	5	25	5	19	3.8	19	3.8	0.76
RK 1*	1720	3	14	4.7	12	4.0	12	4	0.86
RK 2*	1650	4	19	4.8	15	3.8	14	3.5	0.74
RS 1	450	7	31	4.4	28	4.0	25	3.6	0.81
RS 2	450	5	23	4.6	14	2.8	13	2.6	0.57
RS 3	450	3	12	4	7	2.3	4	1.3	0.33
RS 4	450	1	5	5	3	3.0	3	3	0.6
SP 1	1720	1	4	4	0	0.0	0	0	0
SP 2	1720	1	5	5	4	4.0	4	4	0.8
SP 3	1860	3	15	5	15	5.0	10	3.3	0.67
SP 4	1860	9	42	4.7	34	3.8	29	3.2	0.69
SP 5	1860	1	3	3	3	3.0	3	3	1
SP 7	1860	1	3	3	2	2.0	1	1	0.33
Wind	10	9	48	5.3	37	4.1	32	3.6	0.67

Appendix 5 Reproductive success of the Orange-bellied Parrot compared to other *Neophema* species.

Table A8. A comparison of the state of knowledge of clutch size, egg fertility, hatching success, fledging success, breeding success and reproductive output of *Neophema* species derived from data reported in Higgins (1999) and this study.

Neophema species	Level of knowledge	Studies in the wild	Clutch size	Egg fertility	Hatching success	Fledging success	Breeding success	Reproductive output
N. chrysostoma	PK	Giblin & Swindells (1927)	4–6 single records	no data	no data	no data	no data	no data
N. elegans	PK	none	3–7 single records	no data	no data	no data	no data	no data
N. petrophila	PK	none	3–6 single records	no data	no data	no data	no data	no data
N. chrysogaster	WK	this study	4.7	0.86	0.80	0.87	0.69	3.3/nest
N. pulchella	WK	Quin (1990)	4.9	no data	0.74	0.81	0.60	2.3/nest
N. splendida	PK	none	4–6 single records	no data	no data	no data	no data	no data

PK = poorly known, WK = well known.

Appendix 6 Mark-recapture models.

Table A9. Models fitted to fledgling Orange-bellied Parrots banded at Melaleuca. Notations for models are survival (Phi), recapture probability (p), age (a), time (t), constant (.), sex (g) (Cooch and White 2001).

Model	Notation	Description
1	{Phi(a2*g*t) p(a2*g)}	Survival varies by age (juvenile, adult), sex (male, female, unsexed) and time; recapture probability varies by age and sex
2	{Phi(a2*g*t) p(a2)}	Survival varies by age (juvenile, adult), sex (male, female, unsexed) and time; recapture probability varies by age
3	{Phi(a2*g*t) p(g)}	Survival varies by age (juvenile, adult), sex (male, female, unsexed) and time; recapture probability varies by sex
4	{Phi(a2*g*t) p(.)}	Survival varies by age (juvenile, adult), sex (male, female, unsexed) and time; recapture probability constant
5	{Phi(a2*g*t) p(t)}	Survival varies by age (juvenile, adult), sex (male, female, unsexed) and time; recapture probability varies by time
6	{Phi(a2*t) p(a2*g)}	Survival varies by age (juvenile, adult) and time; recapture probability varies by age and sex
7	{Phi(g*t) p(g)}	Survival varies by sex (male, female, unsexed) and time; recapture probability varies by sex
8	{Phi(g*t) p(g*t)}	Survival varies by sex (male, female, unsexed) and time; recapture probability varies by sex and time
9	{Phi(g*t) p(.)}	Survival varies by sex (male, female, unsexed) and time; recapture probability constant
10	{Phi(g*t) p(t)}	Survival varies by sex (male, female, unsexed) and time; recapture probability varies by time
11	{Phi(a2*g) p(a2*g)}	Survival varies by age (juvenile, adult) and sex (male, female, unsexed); recapture probability varies by age and sex
12	{Phi(t) p(g)}	Survival varies by time; recapture probability varies by sex
13	{Phi(a4*g) p(a4*g)}	Survival varies by age (juvenile, 1, 2 and >3 year old adults) and sex; recapture probability varies by age and sex
14	{Phi(t) p(g*t)}	Survival varies by time; recapture probability varies by sex (male, female, unsexed) and time
15	{Phi(a2*g) p(.)}	Survival varies by age (juvenile, adult) and sex (male, female, unsexed); recapture probability constant
16	{Phi(a2*g*t) p(a2*g*t)}	Survival varies by age (juvenile, adult), sex (male, female, unsexed) and time; recapture probability varies by age, sex and time

Table A9 continued. Models fitted to fledgling Orange-bellied Parrots banded at Melaleuca. Notations for models are survival (Phi), recapture probability (p), age (a), time (t), constant (.), sex (g) (Cooch and White 2001).

Model	Notation	Description
17	{Phi(a4*g) p(a4)}	Survival varies by age (juvenile, 1, 2 and >3 year old adults) and sex (male, female, unsexed); recapture probability varies by age
18	{Phi(a4*g) p(.)}	Survival varies by age (juvenile, 1, 2 and >3 year old adults) and sex (male, female, unsexed); recapture probability constant
19	{Phi(g) p(g*t)}	Survival varies by sex (male, female, unsexed); recapture probability varies by time
20	{Phi(g) p(t)}	Survival varies by sex (male, female, unsexed); recapture probability varies by time
21	{Phi(g) p(g)}	Survival varies by sex (male, female, unsexed); recapture probability varies by sex
22	{Phi(a2*t) p(a2)}	Survival varies by age (juvenile, adult) and time; recapture probability varies by age
23	{Phi(g) p(.)}	Survival varies by sex (male, female, unsexed); recapture probability constant
24	{Phi(a2*t) p(.)}	Survival varies by age (juvenile, adult) and time; recapture probability constant
25	{Phi(a3*t) p(a3)}	Survival varies by age (juvenile, 1, 2 and >3 year old adults) sex (male, female, unsexed) and time; recapture probability varies by age and sex
26	{Phi(.) p(g*t)}	Survival constant; recapture probability varies by sex (male, female, unsexed) and time
27	{Phi(a2*t) p(t)}	Survival varies by age (juvenile, adult) and time; recapture probability varies by time
28	{Phi(a3*t) p(.)}	Survival varies by age (juvenile, 1, 2 and >2 year old adults) and time; recapture probability constant
29	{Phi(t) p(.)}	Survival varies by time; recapture probability constant
30	{Phi(t) p(t)}	Survival varies by time; recapture probability varies by time
31	{Phi(a2*t) p(a2*t)}	Survival varies by age (juvenile, adult) and time; recapture probability varies by age and time
32	{Phi(.) p(g)}	Survival constant; recapture probability varies by sex (male, female, unsexed)
33	{Phi(a1*t, a2*g*t) p(.)}	Survival for juveniles varies by time, and for adults by both time and sex; recapture probability constant
34	{Phi(.) p(t)}	Survival constant; recapture probability varies by time
35	{Phi(a3) p(.)}	Survival varies by age (juvenile, 1, 2 and >2 year old adults); recapture probability constant
36	{Phi(a4) p(a4)}	Survival varies by age (juvenile, 1, 2, 3 and >3 year old adults); recapture probability varies by age
37	{Phi(a4) p(.)}	Survival varies by age (juvenile, 1, 2, 3 and >3 year old adults); recapture probability constant
38	{Phi(a2) p(.)}	Survival varies by age (juvenile, adult); recapture probability constant
39	{Phi(.) p(.)}	Survival constant; recapture probability constant

Appendix 7 Orange-bellied Parrot feed table observer effort.

Table A10. Summary of observation effort of wild Orange-bellied Parrots at Melaleuca for the period 1991/92 – 2004/05. Resighting of individuals are recorded once per day.

Season	Observation period	Number of observers	Observation days	Min. observer effort (hrs)	Resightings	Resights/hour effort
1991/92	6 Oct 1991 – 30 Apr 1992	37	194	776	2100	2.7
1992/93	7 Oct 1992 – 24 Apr 1993	36	185	740	2461	3.3
1993/94	8 Oct 1993 – 21 Apr 1994	34	188	752	3864	5.3
1994/95	12 Oct 1994 – 3 Apr 1995	19	147	588	2898	5.0
1995/96	1 Oct 1995 – 10 Apr 1996	24	152	608	2468	4.1
1996/97	18 Oct 1996 – 10 Apr 1997	12	86	344	2108	6.1
1997/98	2 Oct 1997 – 11 Mar 1998	15	95	380	1944	5.1
1998/99	1 Oct 1998 – 22 Mar 1999	19	109	436	1796	4.1
1999/00	5 Sep 1999 – 20 Mar 2000	25	141	564	2139	3.8
2000/01	11 Oct 2000 – 15 Mar 2001	22	132	528	1231	2.3
2001/02	29 Sep 2001 – 14 Mar 2002	20	122	488	1312	2.7
2002/03	2 Oct 2002 – 25 Mar 2003	22	118	472	853	1.8
2003/04	1 Oct 2003 – 10 Mar 2004	19	116	464	1096	2.4
2004/05	29 Oct 2004 – 4 Mar 2005	23	110	440	1054	2.4
	Total/mean	327	1895	7580	27324	3.6

Appendix 8 Orange-bellied Parrot leg injuries.

Table A11. Details of leg injuries observed on banded and unbanded Orange-bellied Parrots at Melaleuca (1991–2005).

Date	Band no.	Sex	Age (yrs)	Injury type	Band type	Outcome
01/12/91	unbanded	F	?	Favouring left foot	none	unknown
04/03/92	230-10189	?	0.17	Lame left leg	ABBBS	Transient injury – sighted regularly up to 03/02/96
10/03/94	230-10062	M	0.19	Favouring right foot	Darvic®	Transient injury – sighted regularly until 07/03/95
03/12/97	230-13805	M	0.92	Swollen right foot	Darvic®	Transient injury – sighted regularly until 01/12/98
02/11/99	230-13758	F	3.83	Deformed right leg	Darvic®	Permanent injury – not sighted after 8/03/00
20/10/00	230-13780	M	4.80	Band constriction right leg	*Acraft™	Permanent injury – not sighted after 23/10/02
18/01/01	unbanded	F	0.05	Deformed left leg as nestling	none	Presumed dead – fledged but not observed
01/02/01	unbanded	M	?	Favouring left foot	none	unknown
14/03/01	230-15630	M	1.20	Swollen right foot	Acraft™	Permanent injury – sighted regularly until 19/02/05
15/10/01	230-13798	M	5.79	Band constriction right leg	*Acraft™	Permanent injury – sighted regularly until 04/12/02
27/11/01	230-13468	M	2.90	Swollen right leg	*Acraft™	Transient injury – not sighted after 30/12/01
17/01/04	230-17197	M	2.04	Bleeding right leg	Acraft™	Transient injury – sighted regularly until 14/02/05
27/01/04	230-17081	F	2.07	Favouring right leg and had head injury and damaged feathers	Acraft™	Presumed dead – not sighted after 14/02/04

* The Acraft™ bands fitted to these birds were subsequently found to be 0.6mm higher than ABBBS recommended bands.

Appendix 9 Mark-recapture model tables.

Table A12. Models of survival (Phi) and capture probability (p) fitted to Orange-bellied Parrot data banded as juveniles. The delta Akaike's Information Criterion (AICc) is the difference between a particular model and the model with the lowest AICc. The AICc weight is the weight associated with each model.

Number	Notation	AICc	Delta AICc	AICc Wt.	Likelihood	# Par.	Deviance
1	{Phi(a2*g*t) p(a2*g)}	2257.18	0	0.99794	1	86	463.0915
2	{Phi(a2*g*t) p(a2)}	2270.36	13.1848	0.00137	0.0014	82	485.3375
3	{Phi(a2*g*t) p(g)}	2272.32	15.1465	0.00051	0.0005	83	485.039
4	{Phi(a2*g*t) p(.)}	2274.44	17.2639	0.00018	0.0002	81	491.6732
5	{Phi(a2*g*t) p(t)}	2284.38	27.2	0	0	94	472.0025
6	{Phi(a2*t) p(a2*g)}	2291.41	34.2381	0	0	33	613.0835
7	{Phi(g*t) p(g)}	2302.30	45.1196	0	0	45	598.5502
8	{Phi(g*t) p(g*t)}	2308.59	51.4117	0	0	81	525.821
9	{Phi(g*t) p(.)}	2310.21	53.0335	0	0	43	610.7311
10	{Phi(g*t) p(t)}	2315.29	58.1175	0	0	55	590.0224
11	{Phi(a2*g) p(a2*g)}	2319.17	61.995	0	0	12	684.2583
12	{Phi(t) p(g)}	2321.88	64.7077	0	0	17	676.7532
13	{Phi(a4*g) p(a4*g)}	2324.24	67.0666	0	0	24	664.6821
14	{Phi(t) p(g*t)}	2330.66	73.4822	0	0	55	605.3871
15	{Phi(a2*g) p(.)}	2330.72	73.5474	0	0	7	705.9552
16	{Phi(a2*g*t) p(a2*g*t)}	2331.15	73.9774	0	0	156	369.0577
17	{Phi(a4*g) p(a4)}	2334.30	77.1235	0	0	16	691.2184
18	{Phi(a4*g) p(.)}	2335.79	78.613	0	0	13	698.8386
19	{Phi(g) p(g*t)}	2336.32	79.1404	0	0	45	632.5711
20	{Phi(g) p(t)}	2339.85	82.6766	0	0	17	694.722
21	{Phi(g) p(g)}	2346.43	89.2567	0	0	6	723.6846
22	{Phi(a2*t) p(a2)}	2353.13	95.9556	0	0	29	683.1737
23	{Phi(g) p(.)}	2355.04	97.8692	0	0	4	736.3287
24	{Phi(a2*t) p(.)}	2355.35	98.1761	0	0	28	687.4799
25	{Phi(a3*t) p(a3)}	2360.92	103.746	0	0	42	663.5725
26	{Phi(.) p(g*t)}	2361.49	104.3119	0	0	43	662.0095
27	{Phi(a2*t) p(t)}	2361.63	104.4563	0	0	40	668.531
28	{Phi(a3*t) p(.)}	2363.01	105.8304	0	0	40	669.9052
29	{Phi(t) p(.)}	2367.39	110.2119	0	0	15	726.3534
30	{Phi(t) p(t)}	2369.99	112.8143	0	0	27	704.2005
31	{Phi(a2*t) p(a2*t)}	2372.15	114.9781	0	0	52	653.3743
32	{Phi(.) p(g)}	2372.29	115.1175	0	0	4	753.5771
33	{Phi(a1*t, a2*g*t) p(.)}	2378.32	121.142	0	0	54	655.2139
34	{Phi(.) p(t)}	2398.04	140.8616	0	0	15	757.003
35	{Phi(a3) p(.)}	2407.88	150.7091	0	0	4	789.1686
36	{Phi(a4) p(a4)}	2409.46	152.2806	0	0	8	782.6653
37	{Phi(a4) p(.)}	2409.85	152.6699	0	0	5	789.1151
38	{Phi(a2) p(.)}	2410.28	153.1086	0	0	3	793.5797
39	{Phi(.) p(.)}	2413.92	156.7433	0	0	2	799.223

Table A13. Survival estimates (Phi) of juvenile and adult sexes derived from Model 1. Standard errors (SE) and mean for each category are shown.

Year	Juvenile Female	SE	Adult Female	SE	Juvenile Male	SE	Adult Male	SE	Juvenile unknown	SE	Adult Unknown	SE
1990/91	0.735	0.1247	-	-	1.000	0.0000	-	-	0.084	0.0800	-	-
1991/92	0.771	0.1039	0.406	0.1607	0.824	0.0992	0.515	0.2105	0.464	0.1534	1.000	0.0000
1992/93	0.625	0.1177	0.908	0.1141	0.705	0.0973	0.866	0.1131	0.577	0.2917	1.000	0.0000
1993/94	0.700	0.1182	0.571	0.1116	0.723	0.0950	0.495	0.0956	0.311	0.1218	0.641	0.1919
1994/95	0.847	0.1096	0.653	0.1095	0.456	0.1204	0.738	0.0891	0.190	0.1766	0.601	0.1846
1995/96	1.000	0.0000	0.675	0.0999	0.805	0.1801	0.622	0.0906	0.559	0.1063	0.250	0.1581
1996/97	0.748	0.1167	0.958	0.0831	0.864	0.0770	0.920	0.0650	0.108	0.1027	0.940	0.0936
1997/98	1.000	0.0000	0.694	0.1072	0.675	0.1032	0.960	0.0590	0.308	0.1139	0.873	0.1347
1998/99	0.440	0.1112	0.257	0.0882	0.467	0.1156	0.539	0.0766	0.334	0.1673	0.253	0.1031
1999/00	0.507	0.1135	0.435	0.1316	0.482	0.0943	0.500	0.0894	0.361	0.2962	0.453	0.1818
2000/01	0.416	0.1067	0.740	0.1287	0.405	0.1199	0.584	0.0979	0.450	229.53425	0.834	0.2237
2001/02	1.000	0.0000	0.705	0.1227	0.896	0.0852	0.429	0.1027	0.338	0.0879	0.504	0.2734
2002/03	1.000	0.0000	0.579	0.1123	1.000	0.0000	0.700	0.1041	0.143	0.0611	0.449	0.1449
2003/04	1.000	0.0000	0.758	0.1515	1.000	0.0000	0.673	0.1183	0.664	0.1237	0.514	0.1701
Mean/SE	0.643 (± 0.0516)		0.632 (± 0.0579)		0.664 (± 0.0571)		0.656 (± 0.0520)		0.325 (± 0.0447)		0.580 (± 0.0774)	

Table A14. Survival estimates (Phi) of juveniles and adults, ignoring sex derived from Model 22. Standard errors (SE) and mean for each category are shown.

Year	Juveniles	SE	Adults	SE
1990/91	0.567	0.0948	-	-
1991/92	0.718	0.0704	0.455	0.1238
1992/93	0.676	0.0748	0.908	0.0712
1993/94	0.583	0.0677	0.535	0.0679
1994/95	0.539	0.0864	0.687	0.0657
1995/96	0.684	0.0780	0.595	0.0642
1996/97	0.671	0.0725	0.935	0.0440
1997/98	0.528	0.0731	0.839	0.0560
1998/99	0.431	0.0729	0.405	0.0537
1999/00	0.494	0.0721	0.476	0.0690
2000/01	0.424	0.0823	0.650	0.0755
2001/02	0.548	0.0628	0.540	0.0773
2002/03	0.339	0.0659	0.605	0.0689
2003/04	0.544	0.0738	0.665	0.0828
Mean/SE	0.554 (± 0.0317)		0.636 (± 0.0147)	

Table A15. Survival estimates (Phi) of juveniles, year 1 adults and year >=2 adults, ignoring sex derived from Model 28. Standard errors (SE) and mean for each category are shown.

Year	Juveniles	SE	Year 1 adult	SE	Year >=2 adult	SE
1990/91	0.581	0.0973	-	-	-	-
1991/92	0.713	0.0698	0.468	0.1303	-	-
1992/93	0.698	0.0777	0.989	0.0564	0.491	0.1879
1993/94	0.586	0.0682	0.455	0.0958	0.605	0.0937
1994/95	0.552	0.0890	0.737	0.0886	0.615	0.0917
1995/96	0.680	0.0776	0.551	0.1181	0.620	0.0762
1996/97	0.667	0.0722	0.999	0.0488	0.897	0.0624
1997/98	0.539	0.0747	0.937	0.0781	0.770	0.0692
1998/99	0.444	0.0755	0.440	0.1015	0.384	0.0614
1999/00	0.502	0.0734	0.415	0.1120	0.504	0.0855
2000/01	0.426	0.0831	0.655	0.1090	0.633	0.1017
2001/02	0.551	0.0632	0.640	0.1370	0.501	0.0933
2002/03	0.343	0.0671	0.687	0.0875	0.474	0.1022
2003/04	0.568	0.0766	0.673	0.1394	0.634	0.0962
Mean/ SE	0.560 (± 0.0312)		0.665 (± 0.0619)		0.590 (± 0.1911)	

Appendix 10 Arrival and departure dates.

Table A16. Dates of first arrival and last observed banded or unbanded Orange-bellied Parrots observed at Melaleuca during the period 1959–2005.

Year	Date of arrival	Date last observed	Source
1959/60	15 –19 October	-	CDK
1960/61	12 October	-	CDK
1961/62	29–30 September	-	CDK
1962/63	11–13 October	-	CDK
1963/64	7 October	-	CDK
1965/66	7–10 October	-	CDK
1966/67	29 Sept – 2 October	-	CDK
1967/68	12–15 October	-	CDK
1969/70	5 October	-	CDK
1970/71	9 October	-	CDK
1971/72	14 October	-	CDK
1972/73	17 October	-	CDK
1973/74	8 October	-	CDK
1974/75	13 October	-	CDK
1975/76	20 October	-	CDK
1976/77	20 October	-	CDK
1978/79	8 October	-	CDK
1979/80	16 October	11 March	PBB
1980/81	3 October	-	PBB
1982/83	5 October	-	PBB
1991/92	6 October	21 April	ODS
1992/93	7 October	**3 April	ODS
1993/94	28 September	21 April	ODS
1994/95	12 October	3 April	ODS
1995/96	1 October	12 April	PBW
1996/97	27 September	18 April	PBW
1997/98	1 October	12 April	PBW
1998/99	1 October	3 April	ODS & PBW
1999/00	*27 September	20 March	ODS & PBW
2000/01	11 October	2 April	ODS & PBW
2001/02	29 September	14 March	ODS & PBW
2002/03	2 October	1 April	PBW
2003/04	8 October	17 April	PBW
2004/05	27 September	29 March	PBW

Source: CDK = Deny King's diaries, PBB = Peter Brown's surveys (Brown & Wilson 1980 and 1981), ODS = observation data sheets, PBW = Peter and Barbara Willson's diaries. * A lone female was observed on the 5th of September 1999. This was considered aberrant behaviour and the 27th is considered the first date of return. ** A captive-bred, released bird stayed at Melaleuca until 10th May 1993.